CLAIMS

What is claimed is:

1. A DVD-Audio disk comprising:

a data zone to store data to be reproduced; and

an information zone to store information on said data to be reproduced;

wherein said information zone includes directories of a video title set (VIDEO_TS) and an audio title set (AUDIO_TS), said AUDIO_TS directory including information on an audio manager (AMG) having information on audio titles; and

wherein said data zone includes said audio titles each having audio title set information (ATSI) followed by a plurality of contiguous audio objects (AOBs), said ATSI includes a plurality of audio stream attributes each having an audio coding mode, a first, second or third quantization bit number corresponding to the data to be reproduced, a first, second or third sampling frequency corresponding to the data to be reproduced, and decoding algorithm information relating to a number of audio channels of the data to be reproduced, and each of said AOBs includes a plurality of audio packs recorded with audio data corresponding to the decoding algorithm stored in the audio stream attribute.

2. A DVD-Audio disk as claimed in Claim 1, wherein if said audio coding mode is linear pulse code modulated (PCM) audio, said first to third quantization bit numbers are respectively 16bits, 20bits and 24bits, said first to third sampling frequencies are respectively 48KHz, 96KHz and 192KHz, and a maximum number of said audio channels is 8.

3. A DVD-Audio disk as claimed in Claim 1, wherein if said audio coding mode is a compression coding system, said first to third quantization bit numbers of the audio data before compression are respectively 16bits, 20bits and 24bits, said

first to third sampling frequencies are respectively 48KHz, 96KHz and 192KHz, and a maximum number of said audio channels is 8.

4. A DVD-Audio disk as claimed in Claim 1, wherein said VIDEO_TS directory includes information on a position of a video manager (VMG) having information on positions of said audio titles reproducible by a DVD-Video player, said VMG being recorded with the information on said audio titles, and each of said audio titles including video title set information and a plurality of contiguous video objects (VOBs).

5. A DVD-Audio disk as claimed in Claim 2, wherein said VIDEO_TS directory includes information on a position of a video manager (VMG) having information on positions of said audio titles reproducible by a DVD-Video player, said VMG being recorded with the information on said audio titles, and each of said audio titles including video title set information and a plurality of contiguous video objects (VOBs).

6. A DVD-Audio disk as claimed in Claim 3, wherein said VIDEO_TS directory includes information on a position of a video manager (VMG) having information on positions of said audio titles reproducible by a DVD-Video player, said VMG being recorded with the information on said audio titles, and each of said audio titles including video title set information and a plurality of contiguous video objects (VOBs).

7. An apparatus for playing a DVD-Audio disk, wherein the DVD-Audio disk includes a data zone to store data to be reproduced by the apparatus and an information zone to store information on said data to be reproduced, said information zone includes directories of a video title set (VIDEO_TS) and an audio title set (AUDIO_TS), wherein said AUDIO_TS directory includes information on an audio manager (AMG) having information on audio titles, wherein said data zone includes said audio titles each

having audio title set information (ATSI) followed by a plurality of contiguous audio objects (AOBs), said ATSI includes a plurality of audio stream attributes each having an audio coding mode, a first, second or third quantization bit number corresponding to the data to be reproduced, a first, second, third, fourth, fifth or sixth sampling frequency corresponding to the data to be reproduced, and decoding algorithm information relating to a number of audio channels of the data to be reproduced, and each of said AOBs includes a plurality of audio packs recorded with audio data corresponding to the decoding algorithm stored in the audio stream attribute, said apparatus comprising:

a data receiver to receive said audio data retrieved from the DVD-Audio disk;

a controller to generate an audio control signal including said audio coding mode, the one of said first through sixth sampling frequencies, the number of audio channels, and the one of said first through third quantization bit numbers based upon information on said audio data [if said Audio_TS has effective data, and stopping a playing operation of said apparatus if said Audio_TS does not have effective data;]

an audio decoder to decode said audio data, to multi-channel mix, sampling-frequency convert and requantize said decoded audio signal according to said audio control signal, to generate output decoded audio data; and

an audio output circuit to convert said output decoded audio data into an analog audio signal.

8. An apparatus as claimed in Claim 7, wherein said audio decoder further comprises:

a stream selector to select one of a plurality of audio streams which form said audio data according to said audio coding mode;

a linear PCM decoding circuit to decode said selected audio stream if said selected audio stream is a linear PCM audio

stream, and to sample frequency convert, multichannel downmix and requantize said decoded audio data according to said audio control signal; and

a coding data decoding circuit to decode said selected audio stream if said selected audio stream is a compression coded audio stream using a corresponding extension algorithm, and to sample frequency convert, multichannel downmix and requantize said decoded audio data according to said audio control signal.

9. An apparatus for playing a DVD-Audio disk and a DVD-Video disk, wherein said DVD-Audio disk includes a data zone to store data to be reproduced by the apparatus and an information zone to store information on said data to be reproduced, said information zone includes directories of a video title set (VIDEO_TS) and an audio title set (AUDIO_TS), wherein said AUDIO_TS directory includes information on an audio manager (AMG) having information on audio titles, wherein said data zone includes said audio titles each having audio title set information (ATSI) followed by a plurality of contiguous audio objects (AOBs), said ATSI includes a plurality of audio stream attributes each having an audio coding mode, a first, second or third quantization bit number corresponding to the data to be reproduced, a first, second, third, fourth, fifth or sixth sampling frequency corresponding to the data to be reproduced, and decoding algorithm information relating to a number of audio channels of the data to be reproduced, and each of said AOBs includes a plurality of audio packs recorded with audio data corresponding to the decoding algorithm stored in the audio stream attribute, said DVD-Video disk including a data zone to store video data, said apparatus comprising:

a data receiver to receive said audio data retrieved from said DVD-Audio disk when said DVD-Audio disk is loaded in said apparatus for reproduction, and to receive said video data retrieved from said DVD-Video when said DVD-Video disk is loaded in said apparatus for reproduction;

a controller to generate an audio control signal including said audio coding mode, the one of said first through sixth sampling frequencies, the number of audio channels, and the one of said first through third quantization bit numbers based upon information on said audio data if said Audio_TS has said effective data, and stopping a playing operation of said apparatus if said Audio_TS does not have said effective data;

a stream parser to separate said video data and audio data output from said data receiver according to a mode control signal from said controller;

a video decoding circuit to decode said video data output from said stream parser in response to said controller controlling a DVD-Video playing mode of said apparatus;

a video output circuit to encode said video data output from said video decoding circuit in NTSC, and to convert said encoded video data into an analog video signal;

an audio decoder having a plurality of audio decoding circuits to decode said audio data output from said stream parser by selecting a corresponding decoding circuit according to said audio coding mode, and to multi-channel mix, sampling-frequency convert and requantize said decoded audio signal according to said audio control signal, to generate an output decoded audio signal; and

an audio output circuit to convert said output decoded audio signal into an analog audio signal.

10. An apparatus as defined in Claim 9, wherein said audio decoder further comprises:

a stream selector to select one of a plurality of audio streams which form said audio data according to said audio coding mode control signal to deliver said selected audio stream to the corresponding one of said plurality of audio decoding circuits;

said plurality of audio decoding circuits including

a linear pulse code modulated (PCM) decoding circuit to decode said selected audio stream when said selected audio stream

is a linear PCM audio stream, and to sampling frequency convert, multichannel downmix and requantize said decoded linear PCM audio stream according to said audio control signal, and

a coding data decoding circuit to decode said selected audio stream when said selected audio stream is a compression coded audio stream by a corresponding extension algorithm, and to sampling frequency convert, multichannel downmix and requantize said decoded compression coded audio stream according to said audio control signal.

11. A method for playing a DVD-Audio disk, wherein the DVD-Audio disk includes a data zone to store data to be reproduced by the apparatus and an information zone to store information on said data to be reproduced, said information zone includes directories of a video title set (VIDEO_TS) and an audio title set (AUDIO_TS), wherein said AUDIO_TS directory includes information on an audio manager (AMG) having information on audio titles, wherein said data zone includes said audio titles each having audio title set information (ATSI) followed by a plurality of contiguous audio objects (AOBs), said ATSI includes a plurality of audio stream attributes each having an audio coding mode, a first, second or third quantization bit number corresponding to the data to be reproduced, a first, second, third, fourth, fifth or sixth sampling frequency corresponding to the data to be reproduced, and decoding algorithm information relating to a number of audio channels of the data to be reproduced, and each of said AOBs includes a plurality of audio packs recorded with audio data corresponding to the decoding algorithm stored in the audio stream attribute, said method comprising the steps of:

locating the AMG when the AUDIO_TS directory includes effective data;

checking out other information of said DVD-Audio disk from the information of the AMG;

reading position data of one of said audio titles selected according to position information of the AMG upon receiving a command for reproducing said one of said audio titles; and

setting an audio decoder to carry out an algorithm for reproducing said one of said audio titles by reading the audio stream attribute of the corresponding ATSI-MAT.

12. A DVD-Audio disk comprising:

digital audio data;

sampling frequency data;

a maximum number of quantization bits information; and

maximum data transfer rate information;

wherein said digital audio data is sampled at said maximum frequency and quantized in said maximum number of bits with a number of channels of said digital audio data limited by said maximum data transfer rate.

13. A DVD-Audio disk as claimed in claim 12, further comprising compression ratio information of coding of said digital audio data, wherein said number of channels of said digital audio data also limited by said compression ratio information.

14. A DVD-Audio disk as claimed in claim 13, wherein said digital audio data is coded as one of lossless psychoacoustic coding and pseudo-lossless psychoacoustic coding.

15. A DVD-Audio disk as claimed in claim 14, wherein said lossless psychoacoustic coding and pseudo-lossless psychoacoustic coding are performed with a DTS coding system.

16. A DVD-Audio disk as claimed in claim 13, wherein said digital audio data is coded as linear pulse code modulated (PCM) coding.

17. A DVD-Audio disk as claimed in claim 12, wherein said sampling frequency is approximately 192KHz, said maximum bit rate is approximately 10.08 Mbps and the number of channels is 8.

18. A DVD-Audio disk comprising:

a data storage area to store audio data to be reproduced, audio titles each having an audio title set management table followed by a plurality of contiguous audio objects, a plurality of audio stream attributes each having an audio coding mode, a quantization bit number, a sampling frequency and decoding algorithm information relating to a number of audio channels of said audio data, wherein each of said audio objects includes a plurality of audio packs having portions of said audio data corresponding to said decoding algorithm stored in said audio stream attribute.

19. A DVD-Audio disk as claimed in claim 18, wherein each of said audio packs comprises:

a pack header;

a packet header;

a sub-stream identification value;

stuffing frame information;

audio frame information; and

one of said portions of said audio data.

20. A DVD-Audio disk as claimed in claim 19, wherein said pack header is 14 bytes, said packet header is 1 byte, said sub-stream identification value is 1 byte, said stuffing frame information is 1 byte, said audio frame information is 3 bytes, and said one portion of said audio data is between 1 and 2013 bytes of linear pulse code modulated (PCM) data.

21. A DVD-Audio disk as claimed in claim 18, wherein each of said audio packs comprises:

a pack header;

a packet header;

a sub-stream identification value;

audio frame information; and

one of said portions of said audio data.

22. A DVD-Audio disk as claimed in claim 21, wherein said pack header is 14 bytes, said packet header is 1 byte, said sub-stream identification value is 1 byte, said audio frame information is 3 bytes and said one portion of said audio data is between 1 and 2016 bytes of Dolby AC-3 data.

23. A DVD-Audio disk as claimed in claim 18, wherein each of said audio packs comprises:

a pack header;

a packet header; and

one of said portions of said audio data.

24. A DVD-Audio disk as claimed in claim 21, wherein said pack header is 14 bytes, said packet header is 1 byte, and said one portion of said audio data is between 1 and 2020 bytes of MPEG data.

25. A DVD-Audio disk as claimed in claim 18, wherein each of said audio packs comprises:

a pack header;

a first packet header for a main audio frame;

a first one of said portions of said audio data in said main audio frame;

a second packet header for an extension audio frame; and

a second one of said portions of said audio data in said extension audio frame.

26. A DVD-Audio disk as claimed in claim 25, wherein said pack header is 14 bytes, said first packet header is 1 byte, said first portion of said audio data is between 1 and 1152 bytes of MPEG data, said second packet header is 1 byte, and said second portion of said audio data is between 1 and 1584 bytes of MPEG data.

27. A DVD-Audio disk as claimed in claim 18, wherein each of said audio packs further comprises a padding packet which is increased based upon a number of samples of said audio data.

28. A DVD-Audio disk as claimed in claim 18, wherein said sampling frequency is approximately 48 KHz, said quantization bit number is 24 bits, and said number of audio channels is 10, when said audio data is linear pulse code modulated (PCM) data.

29. A DVD-Audio disk as claimed in claim 18, wherein a compression rate of said audio data is approximately 2:1 for lossless psychoacoustic coding and approximately 4:1 for lossless pseudo psychoacoustic coding.

30. An apparatus to reproduce data from a DVD, comprising:

a reading unit to read the data from the DVD;

a system controller to determine if an audio title set (AUDIO_TS) of the DVD includes effective data, and controls reproduction of the DVD in a DVD-Audio format if said AUDIO_TS includes said effective data.

31. An apparatus as claimed in claim 30, further comprising:

a data receiver to corrects errors in the read data;

an audio decoder to decode said corrected data;

a digital processor to filter said decoded data; and

an audio output circuit to convert said filtered data to an analog audio signal.

32. An apparatus as claimed in claim 31, wherein said audio decoder comprises:

a stream selector to determine whether said corrected data is linear pulse code modulated (PCM) coded or compression coded;

a linear PCM decoder to decode said linear PCM data to processed data according to a linear PCM decoding method;

a coding data decoder to decode said compression coded data to said processed data according to a corresponding compression decoding method; and

a digital formatter to format said processed data as said decoded data.

33. An apparatus as claimed in claim 30, wherein said system controller controls reproduction of the DVD in a DVD-Video format if said AUDIO_TS does not include said effective data.

34. An apparatus as claimed in claim 33, further comprising:

a data receiver to corrects errors in the read data;

an audio/video decoder to decode said corrected data;

a video output circuit to convert said decoded data to an analog video signal, if said decoded data is indicative of video information and said system controller reproduces the data of the DVD in the DVD-Video format;

a digital processor to filter said decoded data if said decoded data is indicative of audio information, wherein said system controller; and

an audio output circuit to convert said filtered data to an analog audio signal.

35. An apparatus as claimed in claim 34, wherein said video output circuit encodes said decoded data in NTSC to generate said analog video data.

36. An apparatus as claimed in claim 34, wherein said audio/video decoder comprises:

a stream parser to divide said corrected data which is indicative of said video information from said corrected data which is indicative of said audio information;

a video decoder to decode said corrected data indicative of said video information, to generate said decoded data indicative of said video information; and

an audio decoder to decode said corrected data indicative of said audio information, to generate said decoded information indicative of said audio information.

37. An apparatus as claimed in claim 36, wherein said audio decoder includes:

a linear PCM decoder;

a Dolby AC-3 decoder;

a coding data decoder; and

an MPEG decoder;

wherein said system controller drives the corresponding one of said linear PCM decoder, Dolby AC-3 decoder, coding data decoder, and MPEG decoder, to decode said corrected data indicative of said audio information based upon a coding format of said corrected data indicative of said audio information.

38. A method of reproducing data from a DVD, wherein the DVD has a data zone and an information zone, said information zone storing directories of a video title set (VIDEO_TS) and an audio title set (AUDIO_TS), wherein said AUDIO_TS includes information on an audio manager (AMG) which stores information on audio titles and said VIDEO_TS includes information on a video manager (VMG) which stores information on video titles, said method comprising the steps of:

determining whether effective data is stored in said AUDIO_TS, and determining that the disk is a DVD-AUDIO if said effective data is stored in said AUDIO_TS and that the disk is a DVD-Video if said effective data is not stored in said AUDIO_TS;

locating said AMG by reading said AUDIO_TS if the disk is said DVD-Audio;

finding a designated one of said audio titles located from said AMG if the disk is said DVD-Audio;

determining a coding format of said designated audio title and selecting a corresponding decoding format if the disk is said DVD-Audio; and

reproducing said designated audio title using said determined decoding format if the disk is said DVD-Audio.

39. A method as claimed in claim 38, further comprising the steps of:

locating said VMG by reading said VIDEO_TS if the disk is said DVD-Video;

finding a designated one of said video titles located from said VMG if the disk is said DVD-Video; and

reproducing said designated video title if the disk is said DVD-Video.

40. A method as claimed in claim 38, wherein said step of reproducing said designated audio title comprises the steps of:

driving an audio decoding circuit to decode audio data of said audio title;

determining operational state of audio decoding circuit;

decoding said audio data using said audio decoding circuit, confirming said operational state of said audio decoding circuit, and outputting said decoded audio data if said operational state is normal; and

stopping the drive of said audio decoding circuit, performing a repair algorithm on said audio data and restarting the drive of said audio decoding circuit, if said operational state is abnormal.

41. A method as claimed in claim 38, wherein said step of reproducing said designated audio title comprises the steps of:

driving an audio decoding circuit to decode audio data of said audio title;

determining operational state of audio decoding circuit;

decoding said audio data using said audio decoding circuit, confirming said operational state of said audio decoding circuit, and outputting said decoded audio data if said operational state is normal; and

stopping the drive of said audio decoding circuit, performing a repair algorithm on said audio data and restarting the drive of said audio decoding circuit, if said operational state is abnormal.

42. A DVD-Audio disk as claimed in Claim 1, wherein if said audio coding mode is linear pulse code modulated (PCM) audio, a maximum number of said audio channels is determined by the following Eq. 1:

Eq. 1

$$N=\frac{Mb\gamma}{Fs*Qb},$$

wherein Fs is the sampling frequency(Hz), Qb is the quantization bit number, Mbγ is the maximum data transfer rate(Mbps) of the DVD-Audio disk, and N is the maximum number of said audio channels determined by the data transfer rate, sampling frequency and quantization bit number of the DVD-Audio disk.

43. A DVD-Audio disk as claimed in Claim 1, wherein if said audio coding mode is a compression coding system, a maximum number of said audio channels is determined by the following Eq. 2:

Eq. 2

$$N=\frac{Mb\gamma*Cc\gamma}{Fs*Qb},$$

wherein Fs is the sampling frequency(Hz), Qb is the quantization bit number, Mbγ is the maximum data transfer rate(Mbps) of the DVD-Audio disk, Ccγ is a compression ratio according to a DTS compression coding system and N is the maximum number of said audio channels determined by data transfer rate, sampling frequency and quantization bit number of the DVD-Audio disk.

44. A DVD-Audio disk as claimed in Claim 1, wherein if said audio coding mode is linear pulse code modulated (PCM) audio, said first to third quantization bit numbers are respectively 16bits, 20bits and 24bits, said first to third sampling frequencies are respectively 44.1KHz, 88.2KHz and 176.4KHz, a maximum number of said audio channels is 8, and the number of said channels is determined by the following equation:

$$N=\frac{Mbr}{Fs*Qb};$$

wherein,

Fs is the sampling frequency (Hz) of the data to be reproduced, Qb is the quantization bit number (bits) of the data to be reproduced, Mbr is a maximum data transfer rate (Mbps) of the DVD-Audio disk, N is a maximum number of recording channels as determined by the maximum data transfer rate, sampling frequency and quantization bit number of the DVD-Audio disk.

45. A DVD-Audio disk as claimed in Claim 1, wherein if said audio coding mode is pseudo lossless compression coding, said first to third quantization bit numbers of the data to be reproduced before compression are respectively 16bits, 20bits and 24bits, said first to third sampling frequencies are respectively 44.1KHz, 88.2KHz and 176.4KHz, a maximum number of said audio channels 8, and the number of said channels is determined by the following equation:

$$N=\frac{Mbr*Ccr}{Fs*Qb};$$

wherein,

Fs is the sampling frequency (Hz) of the data to be reproduced, Qb is the quantization bit number (bits) of the data to be reproduced, Mbr is a maximum data transfer rate (Mbps) of the DVD-Audio disk, Ccr is a compression ratio according to a DTS compression coding system, and N is a maximum number of recording channels determined by the maximum data transfer rate, sampling frequency and quantization bit number of the DVD-Audio disk.

46. A DVD-Audio disk comprising:

a data zone; and

VIDEO_TS and AUDIO_TS directories positioned at said data zone;

wherein said AUDIO_TS directory includes positional information of an audio manager (AMG), wherein the AMG stores positional information of audio titles of the DVD-Audio disk;

wherein said data zone includes said audio titles which include an audio title set information (ATSI) and a plurality of contiguous audio objects (AOBs);

wherein each ATSI includes audio stream attributes having an audio coding mode, first, second or third quantization bits corresponding to the audio data, a first, second, third, fourth, fifth or sixth sampling frequency corresponding to the audio data and decoding algorithm information related to an audio channel number of the audio; and

wherein each AOB includes a plurality of audio packs having the audio data corresponding to the decoding algorithm recorded on said audio stream attributes.

47. A DVD-Audio disk as claimed in Claim 46, wherein if said audio coding mode is linear pulse code modulated (PCM) audio, said first to third quantization bit numbers are respectively 16bits, 20bits and 24bits, said first to sixth sampling frequencies are respectively 48KHz, 44.1KHz, 96KHz, 88.2KHz, 192KHz and 176.4KHz, a maximum number of said audio channels is 8, and the number of said channels is determined by the following equation:

$$N=\frac{Mbr}{Fs*Qb};$$

wherein,

Fs is the sampling frequency (Hz), Qb is the quantization bit number (bits), Mbr is a maximum data transfer rate (Mbps) of the DVD-Audio disk, and N is a maximum number of recording channels determined by the maximum data transfer rate, sampling frequency and quantization bit number of the DVD-Audio disk.

48. A DVD-Audio disk as claimed in Claim 46, wherein if said audio coding mode is pseudo lossless compression coding, said first to third quantization bit numbers of the audio data before compression are respectively 16bits, 20bits and 24bits, said first to sixth sampling frequencies are respectively 48KHz, 44.1KHz, 96KHz, 88.2KHz, 192KHz and 176.4KHz, a maximum number of said audio channels is 8, and the number of channels is determined by the following equation:

$$N=\frac{Mbr*Ccr}{Fs*Qb};$$

wherein,

Fs is the sampling frequency (Hz) of the audio data, Qb is the quantization bit number (bits) of the audio data, Mbr is a maximum data transfer rate (Mbps) of the DVD-Audio disk, Ccr is a compression ratio according to a DTS compression coding system, and N is a maximum number of recording channels determined by the maximum data transfer rate, sampling frequency and quantization bit number of the DVD-Audio disk.

49. A DVD-Audio disk comprising:

a video directory; and

an audio directory;

wherein both of said video and audio directories contain only audio information.

50. The DVD-Audio disk as claimed in claim 49, wherein the audio information in said video directory has sampling frequencies of at least one of 44.1Khz, 48KHz, 88.2KHz and 96KHz and the audio information in said audio directory has sampling frequencies of at least one of 44.1Khz, 48KHz, 88.2KHz, 96KHz, 176.4KHz and 192KHz.

51. The DVD-Audio disk as claimed in claim 50, wherein the audio information in said video directory has a sampling

frequency of 96KHz, and the audio information in said audio directory has a sampling frequency of 192KHz.

52. The DVD-Audio disk as claimed in claim 50, wherein the audio information in said video directory has a sampling frequency of 88.2KHz, and the audio information in said audio directory has a sampling frequency of 176.4KHz.

53. A DVD-Audio disk comprising:

a video title set directory; and

an audio title set directory to store audio data and control data for allowing reproduction of the audio data.

54. The DVD-Audio disk as claimed in claim 53, wherein the control data comprises a logical data structure containing information on the audio data.

55. The DVD-Audio disk as claimed in claim 53, wherein said video title set directory also stores audio data.

56. The DVD-Audio disk as claimed in claim 55, wherein the audio data in said video title set directory has a first sampling frequency no greater than a limit of a DVD-Video standard, and the audio data in said audio title set directory has a second sampling frequency above the limit.

57. The DVD-Audio disk as claimed in claim 55, wherein the audio data in said video title set directory has sampling frequencies of at least one of 44.1Khz, 48KHz, 88.2KHz and 96KHz and the audio data in said audio title directory has sampling frequencies of at least one of 44.1Khz, 48KHz, 88.2KHz, 96KHz, 176.4KHz and 192KHz.

58. The DVD-Audio disk as claimed in claim 55, wherein the audio data in said video title set directory has a sampling frequency of 96KHz, and the audio data in said audio title set directory has a sampling frequency of 192KHz.

59. The DVD-Audio disk as claimed in claim 58, wherein the audio data in said video title set directory has a sampling frequency of 88.2KHz, and the audio data in said audio title set directory has a sampling frequency of 176.4KHz.

60. An apparatus to reproduce data from a DVD, comprising:

a reading unit to read the data from the disk; and

a system controller to determine if an audio directory of the DVD includes audio data and control information of the audio data, and controls reproduction of the audio data from the audio directory if the audio directory includes the audio data and the control information of the audio data.

61. The apparatus as claimed in claim 60, wherein said system controller controls the reproduction of the audio data from the audio directory when the audio data from the audio directory has a sampling frequency of one of 176.4KHz and 192KHz.

62. A method of reproducing data from a DVD, wherein the DVD has a video directory and an audio directory, said method comprising the steps of:

determining whether audio data and control information is stored in audio directory determining that the DVD is a DVD-Audio if the audio data and control information is stored in the audio directory and that the DVD is a DVD-Video if the audio data and control information of the audio data is not stored in the audio directory; and

reproducing the audio data from the audio directory according to the control information if the DVD is the DVD-Audio and reproducing the audio data from the audio video directory if the DVD is the DVD-Video.

63. The method as claimed in claim 62, wherein said step of reproducing the audio data comprises the steps of:

determining a coding format of the audio data and selecting a corresponding decoding format if the DVD is the DVD-Audio; and

reproducing the audio data using said determined decoding format if the DVD is said DVD-Audio.

64. The method as claimed in claim 62, wherein the audio data from the audio directory of the DVD-Audio has a sampling frequency of one of 176.4KHz and 192KHz, and the audio data from the video directory of the DVD-Video has a sampling frequency of one of 88.2KHz and 96KHz.